

IE410 : Introduction to Robotics

Lab3 Report

Team M410

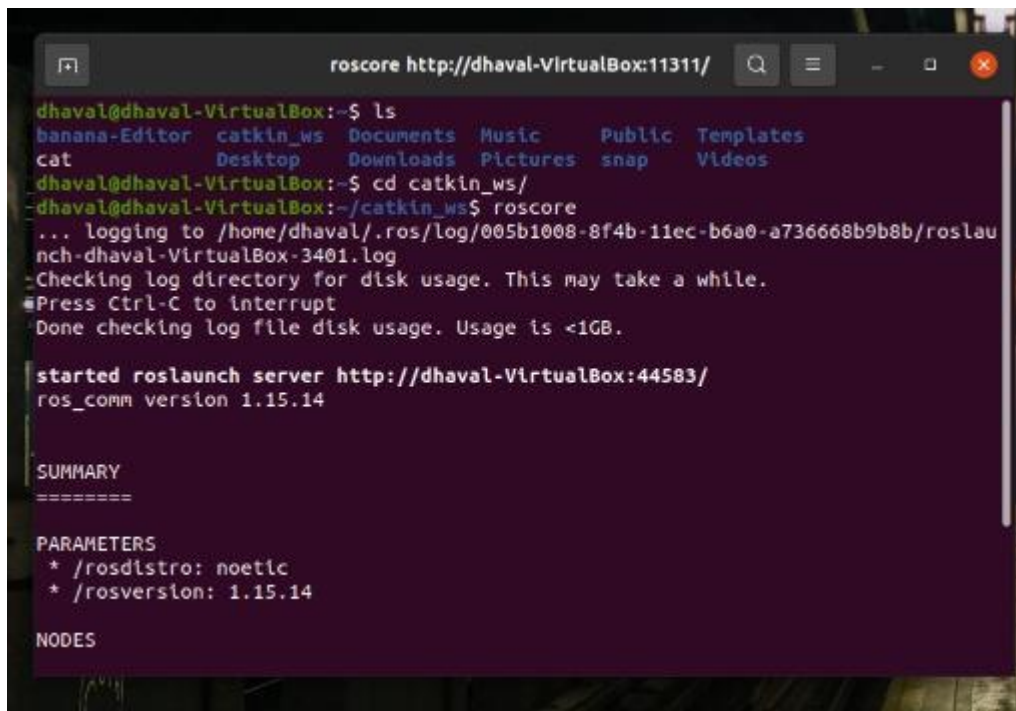
201901011 - Himanshu Dudhatra

201901024 - Dhavalsinh Raj

201901100 - Shubham Patel

201901145 - Gargey Patel

- First we start the roscore by
\$ roscore



```
dhaval@dhaval-VirtualBox:~$ ls
banana-Editor  catkin_ws  Documents  Music      Public  Templates
cat            Desktop    Downloads  Pictures   snap    Videos
dhaval@dhaval-VirtualBox:~$ cd catkin_ws/
dhaval@dhaval-VirtualBox:~/catkin_ws$ roscore
... logging to /home/dhaval/.ros/log/005b1008-8f4b-11ec-b6a0-a736668b9b8b/roslau
nch-dhaval-VirtualBox-3401.log
-Checking log directory for disk usage. This may take a while.
-Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

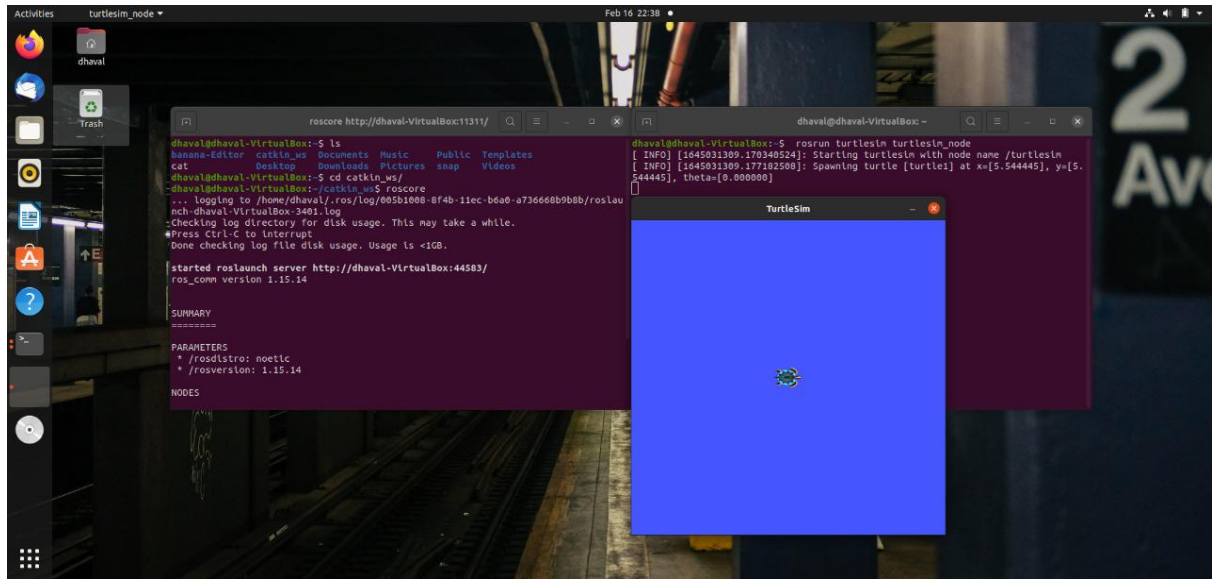
started roslaunch server http://dhaval-VirtualBox:44583/
ros_comm version 1.15.14

SUMMARY
=====

PARAMETERS
* /rostdistro: noetic
* /rosversion: 1.15.14

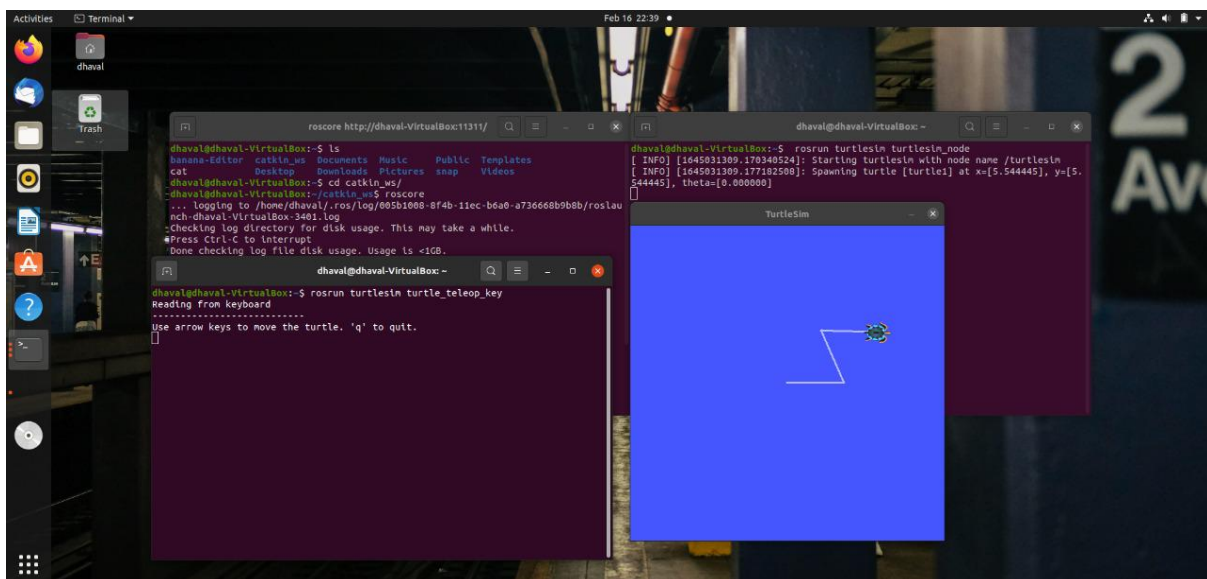
NODES
```

- Then we start turtlesim node by command
\$ rosrn turtlesim turtlesim_node



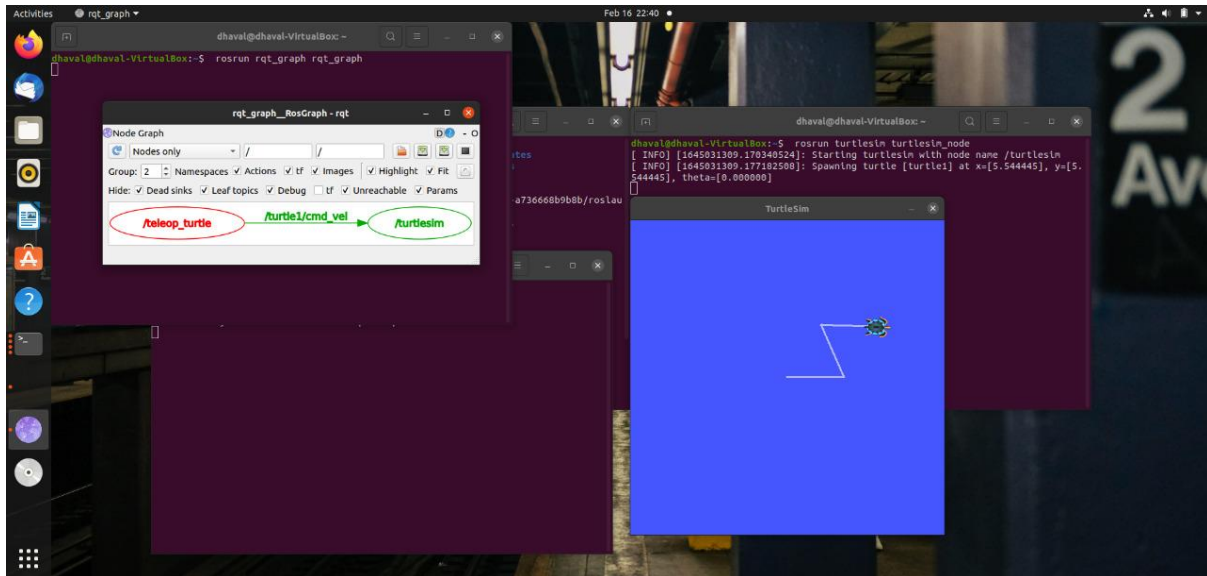
- Now to control the turtle with keys we type
\$ rosrn turtlesim turtle_teleop_key

We can try to move turtle with keys and we can move turtle in an direction

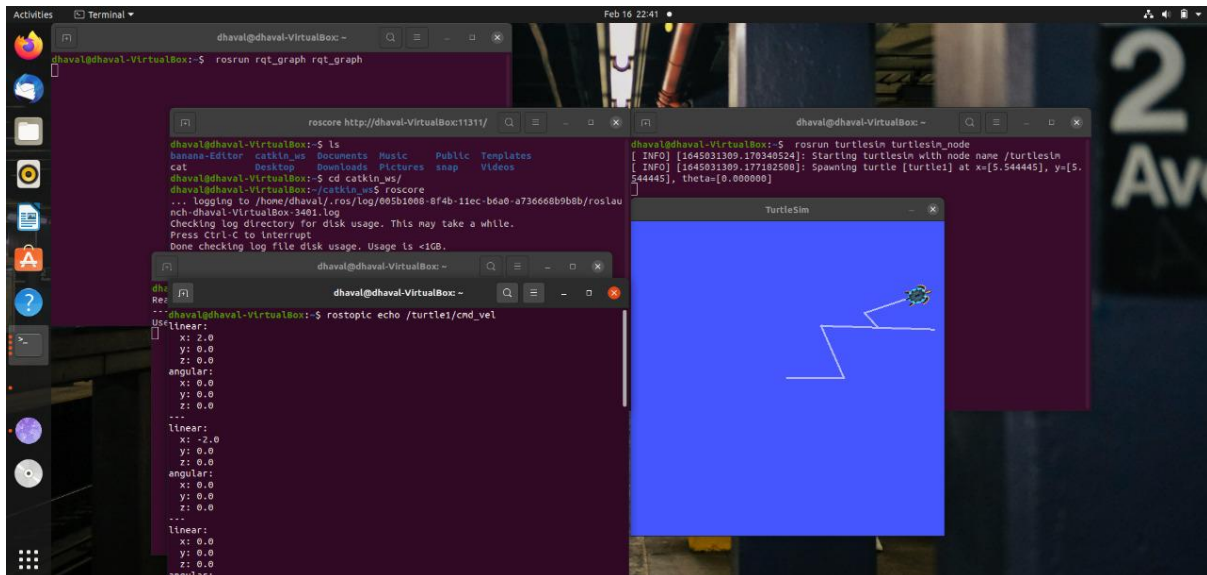


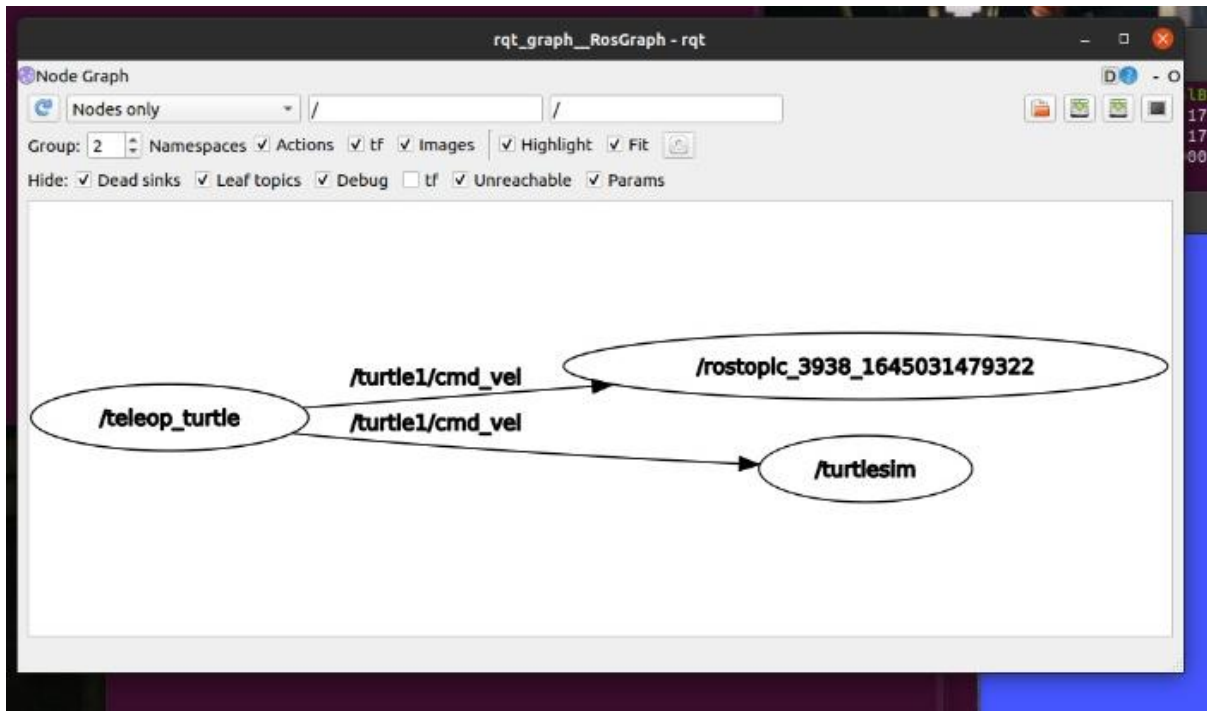
- To shows what is going on in the system we will create an rqt_graph and for this process is
\$ sudo apt-get install ros-neotic-rqt
\$ sudo apt-get install ros-neotic-rqt-common-plugins

- Now we run the `rqt_graph` and for this we write command
`$ rosrn rqt_graph rqt_graph`



- To find about rostopics we write command
`$ rostopic -h`
- Now we will use `rostopic echo` (from above list which we get from `$rostopic -h`) to print the message that are published and for that we write command
`$ rostopic echo /turtle1/cmd_vel`





- By rostopic list command we can list all current topics
\$ rostopic list -v

```
dhaval@dhaval-VirtualBox: ~  
dhaval@dhaval-VirtualBox:~$ rostopic list -v  
  
Published topics:  
* /rosout_agg [rosgraph_msgs/Log] 1 publisher  
* /rosout [rosgraph_msgs/Log] 4 publishers  
* /turtle1/pose [turtlesim/Pose] 1 publisher  
* /turtle1/color_sensor [turtlesim/Color] 1 publisher  
* /turtle1/cmd_vel [geometry_msgs/Twist] 1 publisher  
  
Subscribed topics:  
* /rosout [rosgraph_msgs/Log] 1 subscriber  
* /turtle1/cmd_vel [geometry_msgs/Twist] 2 subscribers  
* /statistics [rosgraph_msgs/TopicStatistics] 1 subscriber  
  
dhaval@dhaval-VirtualBox:~$
```

- We can get the message type of a particular rostopic by command
\$ rostopic type /turtle1/cmd_vel

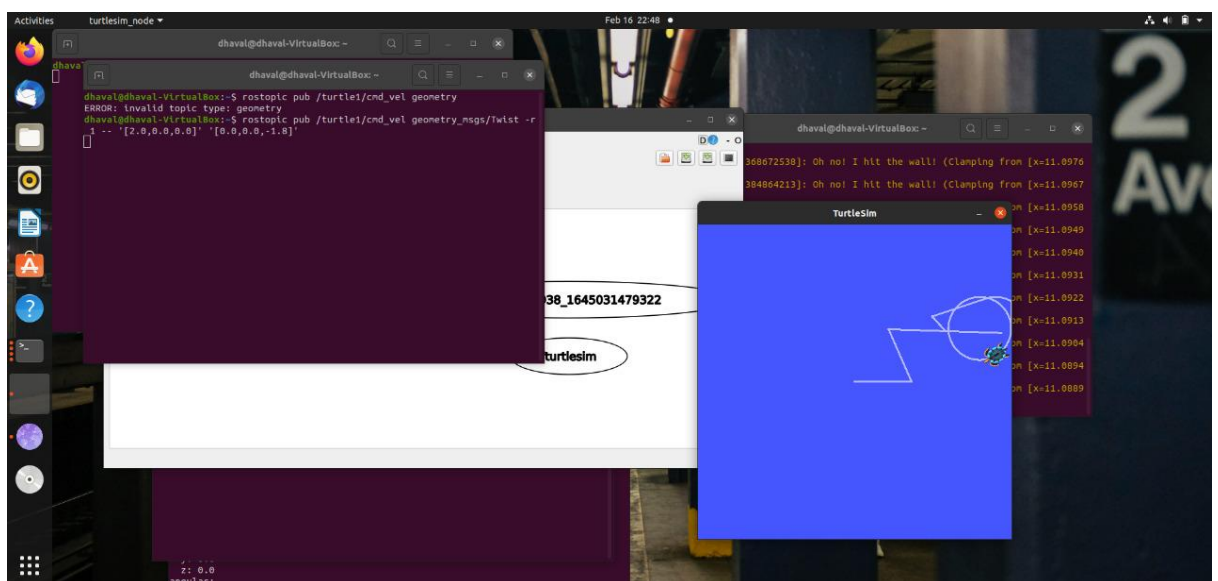
And we can also get additional information about the message by command
\$ rosmmsg show geometry_msgs/Twist

```
dhaval@dhaval-VirtualBox: ~
* /rosout_agg [rosgraph_msgs/Log] 1 publisher
* /rosout [rosgraph_msgs/Log] 4 publishers
* /turtle1/pose [turtlesim/Pose] 1 publisher
* /turtle1/color_sensor [turtlesim/Color] 1 publisher
* /turtle1/cmd_vel [geometry_msgs/Twist] 1 publisher

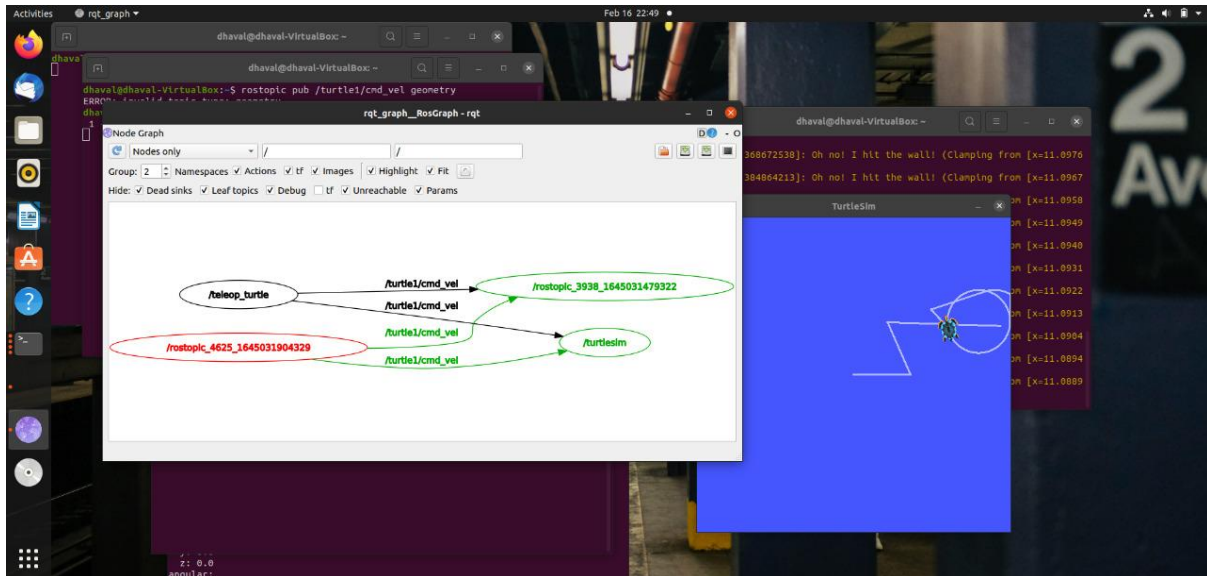
Subscribed topics:
* /rosout [rosgraph_msgs/Log] 1 subscriber
* /turtle1/cmd_vel [geometry_msgs/Twist] 2 subscribers
* /statistics [rosgraph_msgs/TopicStatistics] 1 subscriber

dhaval@dhaval-VirtualBox:~$ rostopic type /turtle1/cmd_vel
geometry_msgs/Twist
dhaval@dhaval-VirtualBox:~$ rosmmsg show geometry_msgs/Twist
geometry_msgs/Vector3 linear
  float64 x
  float64 y
  float64 z
geometry_msgs/Vector3 angular
  float64 x
  float64 y
  float64 z
dhaval@dhaval-VirtualBox:~$
```

- To publish the message repeatedly we can write command
\$ rostopic pub /turtle1/cmd_vel geometry_msgs/Twist -r 1 --
'[2.0,0.0,0.0]' '[0.0,0.0,-1.8]'



- Now we again look at rqt_graph to see commands that controlling turtle



- Now to look at the frequency of message we write command
\$ rostopic hz /turtle1/pose

```
dhaval@dhaval-VirtualBox: ~
dhaval@dhaval-VirtualBox:~$ rostopic hz /turtle1/pose
subscribed to [/turtle1/pose]
average rate: 62.473
  min: 0.010s max: 0.022s std dev: 0.00211s window: 63
average rate: 62.497
  min: 0.010s max: 0.022s std dev: 0.00198s window: 125
average rate: 62.498
  min: 0.010s max: 0.022s std dev: 0.00200s window: 188
average rate: 62.493
  min: 0.008s max: 0.024s std dev: 0.00229s window: 250
average rate: 62.508
  min: 0.008s max: 0.024s std dev: 0.00227s window: 313
average rate: 62.335
  min: 0.008s max: 0.030s std dev: 0.00239s window: 375
average rate: 62.359
  min: 0.002s max: 0.030s std dev: 0.00252s window: 437
average rate: 62.352
  min: 0.002s max: 0.030s std dev: 0.00245s window: 499
average rate: 62.377
  min: 0.002s max: 0.030s std dev: 0.00260s window: 562
average rate: 62.387
  min: 0.002s max: 0.030s std dev: 0.00278s window: 625
^Caverage rate: 62.379
  min: 0.002s max: 0.030s std dev: 0.00277s window: 644
```

- We can see data of a particular topic by command
\$ rosrund rqt_plot rqt_plot

